

Appendix I

Recovery Categories Assessment

1 Introduction

Recovery category areas are an important component of the remedial actions identified in the Lower Duwamish Waterway (LDW) Record of Decision (ROD) (EPA 2014) and are used to help identify the appropriate spatial application of remedial action levels (RALs) and remedial technologies. Recovery category areas were developed in the feasibility study (FS) (AECOM 2012) based on the criteria shown in ROD Table 23 and depicted in ROD Figure 17; see Appendix A of the *Remedial Design Work Plan for the Lower Duwamish Upper Reach* (Anchor and Windward 2019). Recovery category areas were delineated in the ROD based on the following physical and chemical criteria:

1. Identification of vessel-induced scour areas based on a visual review of sun-illuminated bathymetric survey maps
2. Identification of berthing areas based on berthing area information and documentation
3. Identification of sediment transport model (STM)-predicted 100-year high-flow event high-scour areas and STM-predicted net-scour areas
4. Empirical contaminant trends over time, used on a case-by-case basis to adjust recovery categories based on physical criteria (1 through 3)

Modifications to the LDW-wide ROD recovery category areas were made in 2019 at six locations based on criteria 2 and 4 in the *Recovery Category Recommendations Report* (Integral et al. 2019). An additional six modifications to the upper reach recovery category areas were made in Appendix B of the Pre-Design Investigation (PDI) Quality Assurance Project Plan (QAPP) (Windward and Anchor 2020) based on criterion 1, using the 2019 bathymetric survey.

The purpose of this appendix is to assess whether any recovery category modifications in the upper reach are warranted based on a comparison of PDI chemistry data to pre-PDI data (including data from the remedial investigation [RI]/FS, post-FS, and pre-design baseline studies). For this analysis, surface sediment (0–10 cm) data from the PDI were compared with pre-PDI surface sediment data at re-occupied locations (i.e., station locations within 10 ft of each other). This analysis was performed using the same methodology outlined in the *Recovery Category Recommendations Report* (Integral et al. 2019) for criterion 4. Empirical contaminant trends were assessed in the context of the other recovery category criteria near each location. Data for the other criteria are presented in Appendix B of the PDI QAPP (Windward and Anchor 2020), the *Recovery Category Recommendations Report* (Integral et al. 2019), and Appendices D and F to the FS (AECOM 2012).

In addition to the analysis based on chemistry, the review of sun-illuminated bathymetric survey maps (criterion 1) was completed for the three small areas of the upper reach that were not surveyed in 2019 due to vessel obstruction. These areas were surveyed during Phase I PDI sampling in 2020.

2 Contaminant Trend Evaluation

2.1 Methods

Empirical contaminant trends over time were evaluated using the methodology outlined in the *Recovery Category Recommendations Report* (Integral et al. 2019) following a three-step process. First, surface sediment locations within 10 ft of one another that had been re-occupied were identified. No cores were re-occupied as part of the Phase I PDI sampling. Second, concentration changes for total polychlorinated biphenyls (PCBs), carcinogenic polycyclic aromatic hydrocarbons (cPAHs), arsenic, and bis(2-ethylhexyl)phthalate (BEHP) in each location were mapped in one of four color categories:

- **Red:** Contaminant concentration **increased** more than 50% over previous concentration.
- **Gray: No trend** in concentration (defined as less than a 50% change relative to previous concentration).
- **Blue:** Contaminant concentration **decreased** more than 50% from previous concentration.
- **Green:** Both samples in the pair **were below** the Washington State Sediment Management Standard (SMS) benthic sediment cleanup objective (SCO) or lowest ROD RAL for cPAHs.¹

Third, the data for each re-occupied location were interpreted in the context of potential recovery category modifications, consistent with the *Recovery Category Recommendations Report* (Integral et al. 2019), as follows:

- Areas with all contaminant concentrations increasing (red) could be adjusted to Recovery Category 1.
- Areas with mixed results by contaminant of concern (COC) or concentration changes less than 50% could be adjusted to Recovery Category 2.
- Areas with more than 50% decreases or a mix of decreases and changes of less than 50% could be adjusted to Recovery Category 3.
- Areas with concentrations below the benthic SCO or RAL (green) were also determined to be suitable for Recovery Category 3, because these areas have historically recovered or were not historically impacted by concentrations exceeding the benthic SCO or RAL.

Consistent with the *Recovery Category Recommendations Report* (Integral et al. 2019), total PCBs, arsenic, and cPAHs were selected because they are human health risk drivers. BEHP was selected because it had the second highest number of benthic SCO exceedances in the RI/FS dataset

¹ This appendix used the ROD RAL for cPAHs rather than the revised RAL presented in the recently released draft EPA explanation of significant differences (ESD) (EPA 2021), which is expected to be finalized in 2021.

(following total PCBs). Three locations with pre-PDI dioxin/furan data were also re-occupied. None of the pre-PDI or PDI data exceeded the dioxin/furan RAL, so dioxins/furans were not evaluated further.

The comparisons of point sample concentrations were interpreted in the context of the other lines of evidence for recovery category designations (Section 1), and surrounding sediment concentration data. These other lines of evidence consider physical site conditions and contribute to conceptual site model understanding. In addition, uncertainties in point sample comparisons should be acknowledged, such as spatial heterogeneity in sediments, particularly in intertidal sediments; different sampling and analytical events; and analytical variance, which can be up to 25% in a concentration (an acceptability criterion by data validation processes).

2.2 Re-occupied Surface Sediment Data

During the Phase I PDI, several pre-PDI locations sampled during the RI/FS and post-FS sampling events between 1994 to 2018 were re-occupied in 2020 to obtain updated 0-10 cm concentrations for design. Surface concentrations can change over time from ongoing sedimentation and/or erosion processes. These data pairs provide temporal data to assess recovery. When the samples are collected within 10 ft of each other, they are considered to have been successfully re-occupied at the location (see Appendix H, Section 3 for details). Sample pairs identified as re-occupied within 10 ft of each other numbered 38 for cPAHs and BEHP, 44 for arsenic, and 50 for total PCBs. Of these sample pairs, 30 were located in intertidal areas, 20 were located in subtidal areas, and 6 were in the navigation channel.

2.3 Upper Reach Summary

Map I-1, Figure I-1, and Table I-1 summarize the re-occupied surface sediment sampling locations for the upper reach. They show that concentrations have generally decreased over time in the upper reach, consistent with the conceptual site model of natural recovery due to sediment deposition from upstream of the site. The average number of years between sample pairs is 16 years. On average, the following concentration changes were observed (Figure I-1):

- Median PCB concentrations declined from 160 to 98 µg/kg, whereas average PCB concentrations at the re-occupied locations exhibited no change, because of two high PDI sample concentrations.
- Average arsenic concentrations showed minimal changes over time (12 to 13 mg/kg) among paired samples, indicating that concentrations are in equilibrium.

The average cPAH toxic equivalent (TEQ) and BEHP concentrations among the re-occupied locations declined from 508 to 161 µg/kg for cPAHs and from 497 to 121 µg/kg for BEHP. Considering the four

re-occupied station categories described in Section 2.1 (red, gray, blue, green), the following concentration changes were observed (Table I-1):

- Total PCB concentrations were below the benthic SCO (green) for 23 of 50 re-occupied locations. Of the remaining 27 locations, 17 had concentrations that decreased by more than 50% (blue). Another six locations exhibited less than a 50% change (gray), and four locations increased in concentration by more than 50% (red).
- Arsenic concentrations were below the benthic SCO for all samples (green).
- cPAH TEQs decreased by more than 50% at six of the seven locations with TEQs greater than the RAL (blue) and one decreased by less than 50% (gray). The remaining 31 re-occupied stations were below the lowest ROD RAL (green).
- BEHP concentrations at the four locations exceeding the benthic SCO declined by more than 50% (blue). The remaining 31 re-occupied stations were below the benthic SCO (green).

2.4 Area-Specific Summaries

This section summarizes the data for re-occupied surface sediment locations within the upper reach, providing the river mile (RM), side of the LDW (east [E], federal navigation channel [FNC], and/or west [W]), current recovery category designation, empirical data, and any suggested modifications to the recovery category designation. These areas were delineated for the purpose of this analysis only, based on a logical grouping of re-occupied locations. Table I-2 summarizes the data for each area. Maps I-2 through I-6 depict the re-occupied locations, labeled by PDI location. Individual sample IDs, concentrations, and dates are provided for reference in Tables I-3 through I-6. The following bullets summarize the analysis:

- **Recovery Category Evaluation Area 1: RM 3.0 to RM 3.3.** Ten locations were reoccupied in this area, which was a mixture of Recovery Category 1 (FNC) and Recovery Category 3 (W) areas; the area is adjacent to the Boeing Plant 2 early action area (EAA) (E). With one exception, all location concentrations declined by more than 50% or were below the benthic SCO or cPAH RAL. The exception (LDW20-SS133) exhibited no change in concentration for total PCBs (124 to 120 µg/kg).² Overall, the trends are consistent with Recovery Category 3 throughout the area. However, no changes in recovery category designation are recommended (i.e., the Recovery Category 1 area is not recommended to be modified to Recovery Category 3) due to the potential for event-driven high-flow scour in the Recovery Category 1 areas based on the STM model.
- **Recovery Category Evaluation Area 2: RM 3.5 to RM 3.8.** Three locations were re-occupied in this area. The samples are located in Recovery Category 1 and 3 areas near three EAAs: Boeing Plant 2, Terminal 117, and Jorgensen Forge. All re-occupied location concentrations

² The concentration was just above the benthic SCO as compared to the organic carbon normalized concentration.

declined by more than 50% or were below the benthic SCO or cPAH RAL. These results are consistent with a Recovery Category 3 designation. However, no changes in recovery category designation are recommended in this evaluation area due to the potential for event-driven high-flow scour in the Recovery Category 1 areas based on the STM model.

- **Recovery Category Evaluation Area 3: RM 3.9 to RM 4.05(E).** Five locations were re-occupied in this area, which was a mixture of recovery categories. Three locations showed increasing concentrations for PCBs, from 770, 170, and 660 µg/kg in the pre-PDI samples to 3,380, 271, and 3,210 µg/kg in the PDI samples. The other COCs analyzed in both samples were below benthic SCOs or the cPAH RAL. The northernmost data location is immediately adjacent to an enhanced natural recovery/activated carbon (ENR/AC) pilot study intertidal plot. In this location, the increase in PCB concentration may have been caused by a one-time localized disturbance during construction. The southernmost data location also has a localized PCB increase in an area where the physical lines of evidence are consistent with the Recovery Category 3 designation. Considering the mixed results for the four COCs that were part of this analysis and the patterns in surface sediment concentrations in the area (see Map 2-3b in the Phase I DER), the entire evaluation area is assigned to Recovery Category 2, consistent with natural recovery being less certain. Therefore, the southern portion of this intertidal area is changed from Recovery Category 3 to Recovery Category 2 and is contiguous with the existing Recovery Category 2 portion of this area.
- **Recovery Category Evaluation Area 4: RM 4.05 to RM 4.15(E).** This area had seven locations re-occupied within the Recovery Category 3 area just north of Slip 6. All locations had concentrations below benthic SCOs or cPAH RAL, had a less than 50% change in concentration, or showed a greater than 50% decrease in concentration. No change is recommended for this area.
- **Recovery Category Evaluation Area 5: RM 4.15 to RM 4.25(E).** This area had 10 re-occupied locations in either Recovery Categories 1, 2, or 3 areas within Slip 6. Eight of the 10 locations had concentrations that were either below benthic SCOs or cPAH RAL or declining. Two locations had less than a 50% change in concentration for total PCBs. While the chemistry data support modification of Recovery Category 1 to Recovery Category 2 due to a mixture of declining and unchanged concentrations, no change was made because (as noted in ROD Table 23) observed vessel scour in berthing areas is a physical criterion that requires Recovery Category 1 designation. Therefore, no modifications to the recovery category designations are recommended.
- **Recovery Category Evaluation Area 6: RM 4.3 to RM 4.8 (E and W).** This area had six re-occupied locations in Recovery Category 3 areas located near the Turning Basin. All locations showed declining concentrations or were below benthic SCOs or cPAH RAL, consistent with the Recovery Category 3 designation.

- **Recovery Category Evaluation Area 7: RM 4.8 to RM 5.0(E).** This area had eight re-occupied locations within Recovery Category 2 areas near the Norfolk EAA. Seven of the eight locations had concentrations that were declining or below benthic SCO or cPAH RAL. One location's PCB concentration increased from 52 to 329 µg/kg. However, that location was co-located with a second historical sample from 1995, which had a concentration of 360 µg/kg (i.e., no change). These results may be consistent with a Recovery Category 3 designation, but other site conditions (e.g., presence of wingwall structures to help prevent bank erosion) suggest natural recovery is less certain. Therefore, the recommendation is to not change the recovery category.

3 Bathymetric Survey Analysis

In addition to the chemistry analysis, the bathymetric survey evaluation was completed for three small portions of the upper reach that were not surveyed in 2019 due to vessel obstruction, and therefore were not evaluated in the PDI QAPP (Windward and Anchor 2020). These areas were surveyed during Phase I PDI sampling in 2020. All three of these areas have frequent vessel traffic and were previously designated as Recovery Category 1. The additional bathymetric survey data do not suggest revising the recovery category designation in these areas.

4 Recommendations

The recovery categories are based on multiple lines of evidence, and have been evaluated in the FS, the *Recovery Category Recommendations Report* (Integral et al. 2019), and the PDI QAPP. This evaluation considered surface sediment data and bathymetric survey data from the PDI in the context of previous evaluations. Based on this evaluation, the area from RM 4.0 to RM 4.05 is recommended to be modified from Recovery Category 3 to Recovery Category 2 (Map I-7) due to increasing PCB concentrations at three locations and low and stable concentrations for other COCs. No other modifications are recommended.

5 References

- AECOM. 2012. Final feasibility study, Lower Duwamish Waterway. Prepared for Lower Duwamish Waterway Group. AECOM, Seattle, WA.
- Anchor, Windward. 2019. Remedial design work plan for the Lower Duwamish Waterway upper reach. Revised draft final. Submitted to EPA October 28, 2019. Anchor QEA, Inc. and Windward Environmental LLC, Seattle, WA.
- EPA. 2014. Record of Decision. Lower Duwamish Waterway Superfund Site. US Environmental Protection Agency.
- EPA. 2021. Proposed Explanation of Significant Differences Draft for Public Comment. Lower Duwamish Waterway superfund Site. Seattle, Washington. January 2021

Integral, Anchor QEA, Windward. 2019. Recovery category recommendations report. Final. Integral Consulting Inc., Anchor QEA, and Windward Environmental LLC, Seattle, WA.

Windward, Anchor. 2020. Lower Duwamish Waterway quality assurance project plan for remedial design of Upper Reach: pre-design investigation. Final. Submitted to EPA May 19, 2020. Windward Environmental LLC and Anchor QEA, Seattle, WA.

Appendix I Tables

Table I-1

Re-occupied Surface Sediment Data Summary

Chemical	Unit	Sample Pair Count	Sample Pair Trend Counts ^a				Pre-PDI Concentration		Phase 1 PDI Concentration	
			Red (increase > 50%)	Gray (no change [+/- < 50%])	Blue (decrease > 50%)	Green (<SCO/ RAL) ^b	(1994 – 2015)		(2020)	
							Mean	Median	Mean	Median
Total PCBs	µg/kg	50	4	6	17	23	241	160	239	98
Arsenic	mg/kg	44	0	0	0	44	12	10	13	11
cPAHs TEQ	µg/kg	38	0	1	6	31	508	209	161	66
BEHP	µg/kg	38	0	0	4	34	497	215	121	80

Notes:

a. One sample had to have an exceedance of the SCO/ RAL to be red, gray, or blue. Green denotes both samples below the SCO/RAL.

b. SCO/ RAL is used to denote the SMS Benthic SCO (total PCBs, arsenic, and BEHP) or lowest ROD RAL (cPAHs).

BEHP bis(2-ethylhexyl) phthalate

cPAH carcinogenic polycyclic aromatic hydrocarbon

PCB polychlorinated biphenyl

PDI Pre-Design Investigation

RAL remedial action level

ROD record of decision

SCO sediment cleanup objective

SMS sediment management standards

TEQ toxic equivalence

Table I-2

Resampled Surface Sediment Data Summary by Recovery Category Evaluation Area

Recovery Category Evaluation Area	Chemical	Count	Sample Pair Trend Counts				Pre-PDI Concentration		Phase 1 PDI	
			Red (increase > 50%)	Gray (no change [+/- < 50%])	Blue (decrease > 50%)	Green (< SCO/ RAL) ^a	Mean	Median	Mean	Median
1: RM 3.0 to 3.3 (W and FNC)	Total PCBs	11		6	1	4	249	188	90	90
	Arsenic	10				10	8	9	10	10
	cPAHs	4				4	69	76	48	55
	BEHP	4				4	96	107	61	65
2: RM 3.0 to 3.3 (W and FNC)	Total PCBs	3		2		1	227	280	75	106
	Arsenic	3				3	12	14	10	11
	cPAHs	2				2	175	175	80	80
	BEHP	2				2	220	220	92	92
3: RM 3.9 to 4.05 (E)	Total PCBs	3	3				533	660	2,287	3,210
	Arsenic	4				4	9	9	11	10
	cPAHs	2				2	71	71	49	49
	BEHP	2				2	55	55	67	67
4: RM 4.05 to 4.15 (E)	Total PCBs	6		1	2	3	256	111	194	73
	Arsenic	6				6	9	9	9	10
	cPAHs	5		1		4	442	310	159	150
	BEHP	5				5	430	100	60	53
5: RM 4.15 to 4.25 (E)	Total PCBs	10			2	8	134	142	109	112
	Arsenic	10				10	18	20	22	23
	cPAHs	10		3		7	979	840	154	156
	BEHP	10		3		7	1,068	1,085	209	190
6: RM 4.3 To 4.8 (E and W)	Total PCBs	8		3		5	143	103	53	42
	Arsenic	7				7	9	10	9	8
	cPAHs	7		1	1	5	606	110	363	42
	BEHP	7				7	185	130	101	54
7: RM 4.8 to 5.0 (E)	Total PCBs	9	1	5	1	2	334	360	132	108
	Arsenic	4				4	22	17	16	12
	cPAHs	8		1		7	287	140	101	47
	BEHP	8		1		7	479	205	119	54

Table I-2
Resampled Surface Sediment Data Summary by Recovery Category Evaluation Area

Notes:

a. SCO/ RAL is used to denote the SMS Benthic SCO (total PCBs, arsenic, and BEHP) or lowest ROD RAL (cPAHs).

BEHP	bis(2-ethylhexyl) phthalate	RAL	remedial action level
cPAH	carcinogenic polycyclic aromatic hydrocarbon	RM	river mile
PCB	polychlorinated biphenyl	SCO	sediment cleanup objective
PDI	Pre-Design Investigation	TEQ	toxic equivalence

Table I-3
Comparison of PCB Results at Re-sampled Locations

Recovery Category Evaluation Area	RM	RI/FS and Post-FS Data									PDI Phase 1 Data									Location Trend			
		Location Name	Sample Name	Sample Date	Total PCBs (µg/kg dw)	Qualifier	Detected?	Exceeds SCO?	Exceeds CSL?	Detected Above SCO?	Location_Name	Sample_Name	Sample_Date	Total PCBs (µg/kg dw)	Qualifier	Detected	Exceeds_SC O2015	Exceeds_CSL 2015	Detected Above SCO?	Time Between Samples (Years)	Either_Above_ SCO	Pcnt_change	Trend_code
1	3.0	SD-PER205	SD-PER205-0315	18-Mar-15	250		Yes	Yes	No	Yes	LDW20-SS102	LDW20-SS102	05-Jun-20	107.6	J	Yes	No	No	No	5.2	Yes	-57%	blue
1	3.1	LDW-SSB7a	LDW-SSB7a-010	18-Mar-05	104		Yes	No	No	No	LDW20-SS106	LDW20-SS106	10-Jun-20	88.8	J	Yes	No	No	No	15.2	No	-15%	green
1	3.1	B7a	LDW-B7a-5	30-Aug-04	61		Yes	No	No	No	LDW20-SS106	LDW20-SS106	10-Jun-20	88.8	J	Yes	No	No	No	15.8	No	46%	green
1	3.1	SD-DUW75	SD2B-DUW75-0000	02-Apr-96	270		Yes	Yes	No	Yes	LDW20-SS109	LDW20-SS109	05-Jun-20	89.8	J	Yes	No	No	No	24.2	Yes	-67%	blue
1	3.1	SD-PER209	SD-PER209-0315	18-Mar-15	143	J	Yes	Yes	No	Yes	LDW20-SS113	LDW20-SS113	11-Jun-20	15.5	J	Yes	No	No	No	5.2	Yes	-89%	blue
1	3.1	SD-PER208	SD-PER208-0315	19-Mar-15	600		Yes	Yes	No	Yes	LDW20-SS117	LDW20-SS117	05-Jun-20	113.9	J	Yes	No	No	No	5.2	Yes	-81%	blue
1	3.2	SD-PER210	SD-PER210-0315	18-Mar-15	139	J	Yes	No	No	No	LDW20-SS125	LDW20-SS125	10-Jun-20	132.6	J	Yes	No	No	No	5.2	No	-5%	green
1	3.2	DR201	SD-DR201-0000	27-Aug-98	655		Yes	Yes	No	Yes	LDW20-SS127	LDW20-SS127	11-Jun-20	96.1	J	Yes	No	No	No	21.8	Yes	-85%	blue
1	3.2	SD-PER212	SD-PER212-0315	19-Mar-15	124		Yes	Yes	No	Yes	LDW20-SS133	LDW20-SS133	11-Jun-20	121.7	J	Yes	Yes	No	Yes	5.2	Yes	-2%	gray
1	3.3	SD-PER211	SD-PER211-0315	19-Mar-15	188		Yes	No	No	No	LDW20-SS135	LDW20-SS135	10-Jun-20	81.5	J	Yes	No	No	No	5.2	No	-57%	green
1	3.3	LDW-SS106	LDW-SS106-010	08-Mar-05	210		Yes	Yes	No	Yes	LDW20-SS139	LDW20-SS139	11-Jun-20	55.4	J	Yes	No	No	No	15.3	Yes	-74%	blue
2	3.6	SD-PER308	SD-PER308-0315	09-Mar-15	280		Yes	Yes	No	Yes	LDW20-SS203	LDW20-SS203	15-Jun-20	13.9	J	Yes	No	No	No	5.3	Yes	-95%	blue
2	3.7	I13-G	T117-I13-SG	29-Aug-08	20	U	No	No	No	No	LDW20-SS214	LDW20-SS214	15-Jun-20	105.6	J	Yes	No	No	No	11.8	No	428%	green
2	3.8	DR210	SD-DR210-0000	25-Aug-98	380		Yes	Yes	No	Yes	LDW20-SS224	LDW20-SS224	19-Jun-20	106.4	J	Yes	No	No	No	21.8	Yes	-72%	blue
3	3.9	AN-019	AN019-SS-061024	24-Oct-06	770		Yes	Yes	No	Yes	LDW20-SS257	LDW20-SS257	26-Jun-20	3380	J	Yes	Yes	Yes	Yes	13.7	Yes	339%	red
3	4.0	EST145	EST09-05	26-Sep-97	170		Yes	Yes	No	Yes	LDW20-SS266	LDW20-SS266	26-Jun-20	271	J	Yes	Yes	No	Yes	22.8	Yes	59%	red
3	4.0	IT-13	IT-13-SED COMP	28-Jul-11	660		Yes	Yes	No	Yes	LDW20-SS304	LDW20-SS304	25-Jun-20	3210	J	Yes	Yes	Yes	Yes	8.9	Yes	386%	red
4	4.1	RP-05	RP-05	12-Oct-11	122		Yes	No	No	No	LDW20-SS306	LDW20-SS306	23-Jun-20	73.6	J	Yes	No	No	No	8.7	No	-40%	green
4	4.1	RP-07	RP-07	12-Oct-11	103		Yes	No	No	No	LDW20-SS309	LDW20-SS309	24-Jun-20	137.2	J	Yes	Yes	No	Yes	8.7	Yes	33%	gray
4	4.1	SB-12	Upper SB-12	25-Aug-04	119		Yes	No	No	No	LDW20-SS310	LDW20-SS310	18-Jun-20	72.2	J	Yes	No	No	No	15.8	No	-39%	green
4	4.1	RP-10	RP-10	12-Oct-11	1040		Yes	Yes	No	Yes	LDW20-SS313	LDW20-SS313	24-Jun-20	794	J	Yes	Yes	No	Yes	8.7	Yes	-24%	gray
4	4.1	RP-23	RP-23	13-Feb-12	58		Yes	No	No	No	LDW20-SS318	LDW20-SS318	18-Jun-20	63.7	J	Yes	No	No	No	8.4	No	10%	green
4	4.1	SH-06	Upper SH-06	25-Aug-04	94		Yes	Yes	No	Yes	LDW20-SS320	LDW20-SS320	25-Jun-20	22.8	J	Yes	No	No	No	15.8	Yes	-76%	blue
6	4.2	LDW-SS131	LDW-SS131-010	08-Mar-05	21	J	Yes	No	No	No	LDW20-SS332	LDW20-SS332	17-Jun-20	82.6	J	Yes	No	No	No	15.3	No	293%	green
5	4.2	DR176	SD-DR176-0000	31-Aug-98	219		Yes	No	No	No	LDW20-SS338	LDW20-SS338	10-Jun-20	115.3	J	Yes	No	No	No	21.8	No	-47%	green
5	4.2	SB-8	Upper SB-08	26-Aug-04	60	J	Yes	No	No	No	LDW20-SS340	LDW20-SS340	16-Jun-20	83.9	J	Yes	No	No	No	15.8	No	40%	green
5	4.2	DR243	SD-DR243-0000	24-Aug-98	118	J	Yes	No	No	No	LDW20-SS345	LDW20-SS345	16-Jun-20	100.6	J	Yes	No	No	No	21.8	No	-15%	green
5	4.2	DR244	SD-DR244-0000	01-Sep-98	133	J	Yes	Yes	No	Yes	LDW20-SS346	LDW20-SS346	16-Jun-20	122	J	Yes	No	No	No	21.8	Yes	-8%	gray
5	4.2	SB-5	Upper SB-05	24-Aug-04	150		Yes	Yes	No	Yes	LDW20-SS347	LDW20-SS347	15-Jun-20	104.6	J	Yes	No	No	No	15.8	Yes	-30%	gray
5	4.2	SB-4	Upper SB-04	24-Aug-04	170		Yes	No	No	No	LDW20-SS348	LDW20-SS348	16-Jun-20	116.3	J	Yes	No	No	No	15.8	No	-32%	green
5	4.2	R44	SD0071	16-Oct-97	68	J	Yes	No	No	No	LDW20-SS349	LDW20-SS349	16-Jun-20	107.4	J	Yes	No	No	No	22.7	No	58%	green
5	4.2	SB-1	Upper SB-01	25-Aug-04	170		Yes	No	No	No	LDW20-SS351	LDW20-SS351	16-Jun-20	115.3	J	Yes	No	No	No	15.8	No	-32%	green
5	4.2	SB-3	Upper SB-03	24-Aug-04	180		Yes	No	No	No	LDW20-SS352	LDW20-SS352	15-Jun-20	108.4	J	Yes	No	No	No	15.8	No	-40%	green
5	4.2	LDW-SS2080-A	LDW-SS2080-A	21-Mar-11	68		Yes	No	No	No	LDW20-SS353	LDW20-SS353	16-Jun-20	120.5	J	Yes	No	No	No	9.2	No	77%	green

Table I-3
Comparison of PCB Results at Re-sampled Locations

Recovery Category Evaluation Area	RM	RI/FS and Post-FS Data									PDI Phase 1 Data									Location Trend			
		Location Name	Sample Name	Sample Date	Total PCBs (µg/kg dw)	Qualifier	Detected?	Exceeds SCO?	Exceeds CSL?	Detected Above SCO?	Location_Name	Sample_Name	Sample_Date	Total PCBs (µg/kg dw)	Qualifier	Detected	Exceeds_SC O2015	Exceeds_CSL 2015	Detected Above SCO?	Time Between Samples (Years)	Either_Above_ SCO	Pcnt_change	Trend_code
6	4.3	WIT258	WIT05-01	01-Oct-97	340		Yes	Yes	No	Yes	LDW20-SS359	LDW20-SS359	18-Jun-20	34.4	J	Yes	No	No	No	22.7	Yes	-90%	blue
6	4.4	R63	SD0035	13-Oct-97	105	J	Yes	No	No	No	LDW20-SS364	LDW20-SS364	10-Jun-20	71.1	J	Yes	No	No	No	22.7	No	-32%	green
6	4.5	LDW-SSB9a	LDW-SSB9a-010	15-Mar-05	100		Yes	No	No	No	LDW20-SS372	LDW20-SS372	17-Jun-20	42.3	J	Yes	No	No	No	15.3	No	-58%	green
6	4.5	B9a	LDW-B9a-S	27-Aug-04	270		Yes	Yes	No	Yes	LDW20-SS372	LDW20-SS372	17-Jun-20	42.3	J	Yes	No	No	No	15.8	Yes	-84%	blue
6	4.6	R75	SD0049	15-Oct-97	260		Yes	Yes	No	Yes	LDW20-SS377	LDW20-SS377	18-Jun-20	81.5	J	Yes	No	No	No	22.7	Yes	-69%	blue
6	4.7	BKG-2	BKG-2-SED COMP	30-Jul-11	23		Yes	No	No	No	LDW20-SS383	LDW20-SS383	25-Jun-20	34.7	J	Yes	No	No	No	8.9	No	51%	green
6	4.8	B10a	LDW-B10a-S	30-Aug-04	22		Yes	No	No	No	LDW20-SS389	LDW20-SS389	25-Jun-20	38.7	J	Yes	No	No	No	15.8	No	76%	green
7	4.9	NFK304	L7462-4	06-Dec-95	360		Yes	Yes	No	Yes	LDW20-SS401	LDW20-SS401	23-Jun-20	329	J	Yes	Yes	No	Yes	24.6	Yes	-9%	gray
7	4.9	LDW-SS2097-D	LDW-SS2097-D	18-Mar-11	52		Yes	No	No	No	LDW20-SS401	LDW20-SS401	23-Jun-20	329	J	Yes	Yes	No	Yes	9.3	Yes	533%	red
7	4.9	NFK307	L7462-7	06-Dec-95	450		Yes	Yes	No	Yes	LDW20-SS404	LDW20-SS404	24-Jun-20	4	UJ	No	No	No	No	24.6	Yes	-99%	blue
7	4.9	NFK308	L7462-8	06-Dec-95	852		Yes	Yes	No	Yes	LDW20-SS406	LDW20-SS406	23-Jun-20	78	J	Yes	No	No	No	24.6	Yes	-91%	blue
7	4.9	NFK311	L7462-11	05-Dec-95	301		Yes	Yes	No	Yes	LDW20-SS407	LDW20-SS407	24-Jun-20	72.4	J	Yes	No	No	No	24.6	Yes	-76%	blue
7	4.9	LDW-SS144	LDW-SS144-010	15-Mar-05	480		Yes	Yes	No	Yes	LDW20-SS411	LDW20-SS411	22-Jun-20	126.7	J	Yes	Yes	No	Yes	15.3	Yes	-74%	blue
7	4.9	12	288141	09-Jul-02	40	J	Yes	No	No	No	LDW20-SS419	LDW20-SS419	25-Jun-20	32.4	J	Yes	No	No	No	18.0	No	-19%	green
7	4.9	NFK004A	L4384-1	22-Aug-94	377		Yes	Yes	No	Yes	LDW20-SS423	LDW20-SS423	30-Jun-20	108	J	Yes	No	No	No	25.9	Yes	-71%	blue
7	5.0	NFK006	L4321-6	18-Aug-94	96		Yes	No	No	No	LDW20-SS426	LDW20-SS426	17-Jun-20	107.5	J	Yes	No	No	No	25.9	No	12%	green

Table I-4
Comparison of Arsenic Results at Re-sampled Locations

		RI/FS and Post-FS Data								PDI Phase 1 Data								Location Trend			
Recovery Category Evaluation Area	RM	Location Name	Sample Name	Sample Date	Arsenic (mg/kg)	Qualifier	Detected?	Exceeds SCO?	Detected Above SCO?	Location_Name	Sample_Name	Sample_Date	Arsenic (mg/kg)	Qualifier	Detected	Exceeds_ SCO2015	Detected Above SCO?	Time Between Samples (Years)	Either_ Above_SCO	Pcnt_change	Trend_code
1	3.0	SD-PER205	SD-PER205-0315	18-Mar-15	9.7		Yes	No	No	LDW20-SS102	LDW20-SS102	05-Jun-20	8.6		Yes	No	No	5.2	No	-11%	green
1	3.1	B7a	LDW-B7a-S	30-Aug-04	6.56	J	Yes	No	No	LDW20-SS106	LDW20-SS106	10-Jun-20	12.8		Yes	No	No	15.8	No	95%	green
1	3.1	LDW-SSB7a	LDW-SSB7a-010	18-Mar-05	9.2		Yes	No	No	LDW20-SS106	LDW20-SS106	10-Jun-20	12.8		Yes	No	No	15.2	No	39%	green
1	3.1	SD-PER209	SD-PER209-0315	18-Mar-15	6.3		Yes	No	No	LDW20-SS113	LDW20-SS113	11-Jun-20	4.87		Yes	No	No	5.2	No	-23%	green
1	3.1	SD-PER208	SD-PER208-0315	19-Mar-15	9.8		Yes	No	No	LDW20-SS117	LDW20-SS117	05-Jun-20	12.1		Yes	No	No	5.2	No	23%	green
1	3.2	SD-PER210	SD-PER210-0315	18-Mar-15	9.8		Yes	No	No	LDW20-SS125	LDW20-SS125	10-Jun-20	14.2		Yes	No	No	5.2	No	45%	green
1	3.2	DR201	SD-DR201-0000	27-Aug-98	10.7		Yes	No	No	LDW20-SS127	LDW20-SS127	11-Jun-20	10.8		Yes	No	No	21.8	No	1%	green
1	3.2	SD-PER212	SD-PER212-0315	19-Mar-15	5.2		Yes	No	No	LDW20-SS133	LDW20-SS133	11-Jun-20	8.97		Yes	No	No	5.2	No	73%	green
1	3.3	SD-PER211	SD-PER211-0315	19-Mar-15	8.2		Yes	No	No	LDW20-SS135	LDW20-SS135	10-Jun-20	4.46		Yes	No	No	5.2	No	-46%	green
1	3.3	LDW-SS106	LDW-SS106-010	08-Mar-05	5		Yes	No	No	LDW20-SS139	LDW20-SS139	11-Jun-20	6.91		Yes	No	No	15.3	No	38%	green
2	3.6	SD-PER308	SD-PER308-0315	09-Mar-15	7.2		Yes	No	No	LDW20-SS203	LDW20-SS203	15-Jun-20	4.7	J	Yes	No	No	5.3	No	-35%	green
2	3.7	R19	SD0019	11-Oct-97	13.6		Yes	No	No	LDW20-SS214	LDW20-SS214	15-Jun-20	11.1	J	Yes	No	No	22.7	No	-18%	green
2	3.8	DR210	SD-DR210-0000	25-Aug-98	15		Yes	No	No	LDW20-SS224	LDW20-SS224	19-Jun-20	13.1		Yes	No	No	21.8	No	-13%	green
3	3.9	AN-019	AN019-SS-061024	24-Oct-06	8.6		Yes	No	No	LDW20-SS257	LDW20-SS257	26-Jun-20	10.5		Yes	No	No	13.7	No	22%	green
3	4.0	SH-01	Upper SH-01	24-Aug-04	8.3		Yes	No	No	LDW20-SS301	LDW20-SS301	24-Jun-20	8.5		Yes	No	No	15.8	No	2%	green
3	4.0	SH-02	Upper SH-02	24-Aug-04	11		Yes	No	No	LDW20-SS302	LDW20-SS302	24-Jun-20	10		Yes	No	No	15.8	No	-9%	green
3	4.0	IT-13	IT-13-SED COMP	28-Jul-11	10		Yes	No	No	LDW20-SS304	LDW20-SS304	25-Jun-20	13.4		Yes	No	No	8.9	No	34%	green
4	4.1	RP-05	RP-05	12-Oct-11	10.8		Yes	No	No	LDW20-SS306	LDW20-SS306	23-Jun-20	10.9		Yes	No	No	8.7	No	1%	green
4	4.1	RP-07	RP-07	12-Oct-11	9		Yes	No	No	LDW20-SS309	LDW20-SS309	24-Jun-20	4.71		Yes	No	No	8.7	No	-48%	green
4	4.1	SB-12	Upper SB-12	25-Aug-04	14		Yes	No	No	LDW20-SS310	LDW20-SS310	18-Jun-20	12.5		Yes	No	No	15.8	No	-11%	green
4	4.1	RP-23	RP-23	13-Feb-12	9.9		Yes	No	No	LDW20-SS318	LDW20-SS318	18-Jun-20	10.4		Yes	No	No	8.4	No	5%	green
4	4.1	SH-06	Upper SH-06	25-Aug-04	6.3		Yes	No	No	LDW20-SS320	LDW20-SS320	25-Jun-20	3.01		Yes	No	No	15.8	No	-52%	green
4	4.2	SH-08	Upper SH-08	25-Aug-04	6.4		Yes	No	No	LDW20-SS323	LDW20-SS323	24-Jun-20	9.84		Yes	No	No	15.8	No	54%	green
6	4.2	LDW-SS131	LDW-SS131-010	08-Mar-05	10.4		Yes	No	No	LDW20-SS332	LDW20-SS332	17-Jun-20	9.02		Yes	No	No	15.3	No	-13%	green
5	4.2	DR176	SD-DR176-0000	31-Aug-98	12		Yes	No	No	LDW20-SS338	LDW20-SS338	10-Jun-20	17		Yes	No	No	21.8	No	42%	green
5	4.2	SB-8	Upper SB-08	26-Aug-04	14		Yes	No	No	LDW20-SS340	LDW20-SS340	16-Jun-20	18		Yes	No	No	15.8	No	29%	green
5	4.2	DR243	SD-DR243-0000	24-Aug-98	20.8		Yes	No	No	LDW20-SS345	LDW20-SS345	16-Jun-20	22.9		Yes	No	No	21.8	No	10%	green
5	4.2	DR244	SD-DR244-0000	01-Sep-98	17.5		Yes	No	No	LDW20-SS346	LDW20-SS346	16-Jun-20	19.8		Yes	No	No	21.8	No	13%	green
5	4.2	SB-5	Upper SB-05	24-Aug-04	20		Yes	No	No	LDW20-SS347	LDW20-SS347	15-Jun-20	24.4	J	Yes	No	No	15.8	No	22%	green
5	4.2	SB-4	Upper SB-04	24-Aug-04	20		Yes	No	No	LDW20-SS348	LDW20-SS348	16-Jun-20	25		Yes	No	No	15.8	No	25%	green
5	4.2	R44	SD0071	16-Oct-97	12.6		Yes	No	No	LDW20-SS349	LDW20-SS349	16-Jun-20	23.7		Yes	No	No	22.7	No	88%	green
5	4.2	SB-1	Upper SB-01	25-Aug-04	22		Yes	No	No	LDW20-SS351	LDW20-SS351	16-Jun-20	23.1		Yes	No	No	15.8	No	5%	green
5	4.2	SB-3	Upper SB-03	24-Aug-04	22.6		Yes	No	No	LDW20-SS352	LDW20-SS352	15-Jun-20	25	J	Yes	No	No	15.8	No	11%	green
5	4.2	LDW-SS2080-A	LDW-SS2080-A	21-Mar-11	20		Yes	No	No	LDW20-SS353	LDW20-SS353	16-Jun-20	22.8		Yes	No	No	9.2	No	14%	green

Table I-4
Comparison of Arsenic Results at Re-sampled Locations

		RI/FS and Post-FS Data								PDI Phase 1 Data								Location Trend			
Recovery Category Evaluation Area	RM	Location Name	Sample Name	Sample Date	Arsenic (mg/kg)	Qualifier	Detected?	Exceeds SCO?	Detected Above SCO?	Location_Name	Sample_Name	Sample_Date	Arsenic (mg/kg)	Qualifier	Detected	Exceeds_ SCO2015	Detected Above SCO?	Time Between Samples (Years)	Either_ Above_SCO	Pcnt_change	Trend_code
6	4.4	R63	SD0035	13-Oct-97	10.5		Yes	No	No	LDW20-SS364	LDW20-SS364	10-Jun-20	15.8		Yes	No	No	22.7	No	50%	green
6	4.5	B9a	LDW-B9a-S	27-Aug-04	6.63	J	Yes	No	No	LDW20-SS372	LDW20-SS372	17-Jun-20	8.06		Yes	No	No	15.8	No	22%	green
6	4.5	LDW-SSB9a	LDW-SSB9a-010	15-Mar-05	5.9		Yes	No	No	LDW20-SS372	LDW20-SS372	17-Jun-20	8.06		Yes	No	No	15.3	No	37%	green
6	4.6	R75	SD0049	15-Oct-97	11		Yes	No	No	LDW20-SS377	LDW20-SS377	18-Jun-20	11.9		Yes	No	No	22.7	No	8%	green
6	4.7	BKG-2	BKG-2-SED COMP	30-Jul-11	10	U	No	No	No	LDW20-SS383	LDW20-SS383	25-Jun-20	6.31		Yes	No	No	8.9	No	-37%	green
6	4.8	B10a	LDW-B10a-S	30-Aug-04	9.23	J	Yes	No	No	LDW20-SS389	LDW20-SS389	25-Jun-20	6.85		Yes	No	No	15.8	No	-26%	green
7	4.9	LDW-SS2097-D	LDW-SS2097-D	18-Mar-11	10		Yes	No	No	LDW20-SS401	LDW20-SS401	23-Jun-20	11.5		Yes	No	No	9.3	No	15%	green
7	4.9	LDW-SS144	LDW-SS144-010	15-Mar-05	3.4		Yes	No	No	LDW20-SS411	LDW20-SS411	22-Jun-20	4.56		Yes	No	No	15.3	No	34%	green
7	4.9	NFK004A	L4384-1	22-Aug-94	23.6		Yes	No	No	LDW20-SS423	LDW20-SS423	30-Jun-20	11.6		Yes	No	No	25.9	No	-51%	green
7	5.0	NFK006	L4321-6	18-Aug-94	51		Yes	No	No	LDW20-SS426	LDW20-SS426	17-Jun-20	36.4		Yes	No	No	25.9	No	-29%	green

Table I-5
Comparison of cPAH Results at Re-sampled Locations

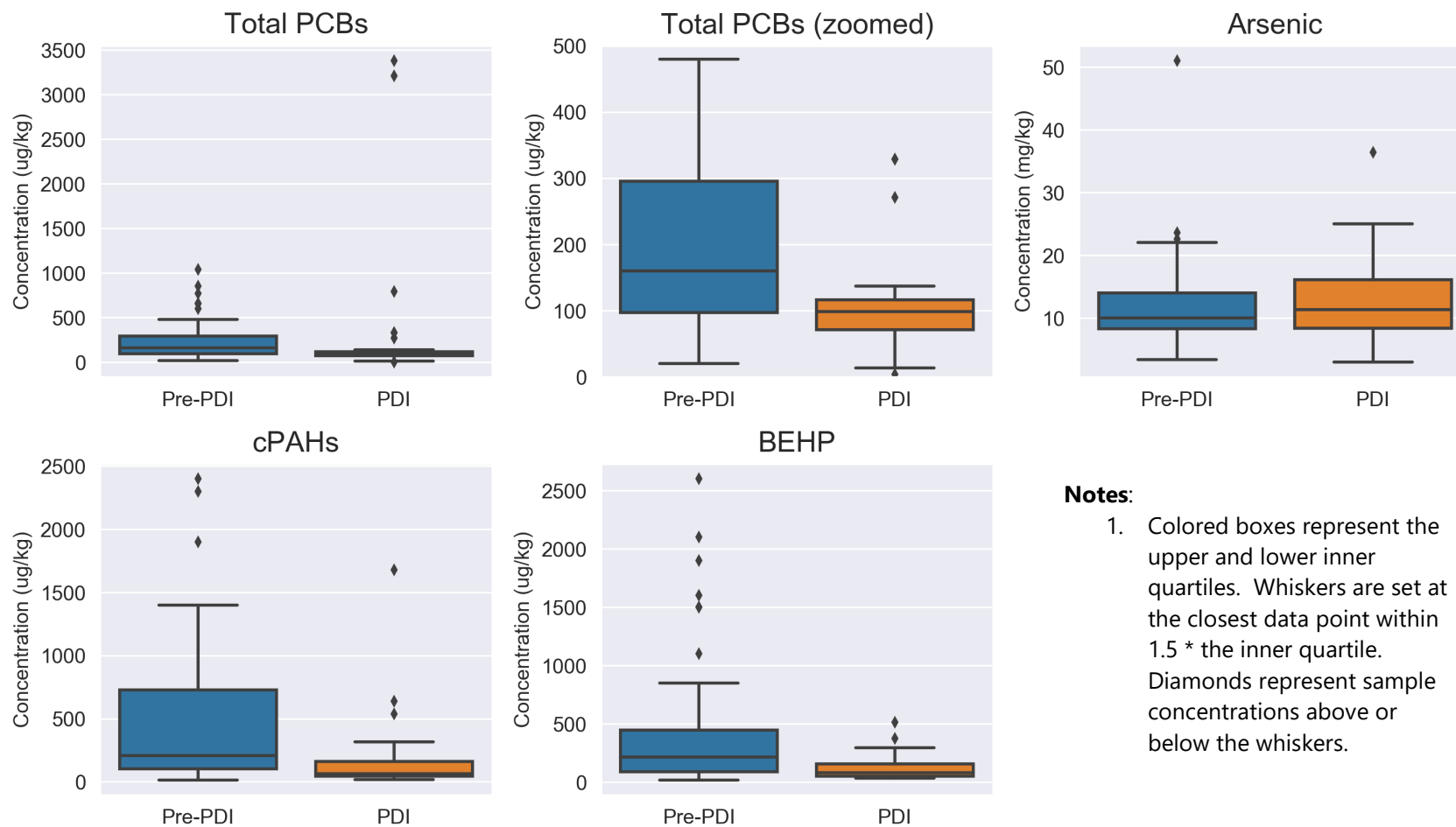
		RI/FS and Post-FS Data							PDI Phase 1 Data							Location Trend			
Recovery Category Evaluation Area	RM	Location Name	Sample Name	Sample Date	cPAH (µg TEQ/kg dw)	Qualifier	Detected?	Detected Above RAL (1,000 µg/kg)	Location_Name	Sample_Name	Sample_Date	cPAH (µg TEQ/kg dw)	Qualifier	Detected	Detected Above RAL (1,000 µg/kg)	Time Between Samples (Years)	Either_Above _RAL	Pcnt_change	Trend_code
1	3.1	LDW-SSB7a	LDW-SSB7a-010	18-Mar-05	110		Yes	No	LDW20-SS106	LDW20-SS106	10-Jun-20	54.9		Yes	No	15.2	No	-50%	green
1	3.1	B7a	LDW-B7a-S	30-Aug-04	61		Yes	No	LDW20-SS106	LDW20-SS106	10-Jun-20	54.9		Yes	No	15.8	No	-10%	green
1	3.2	DR201	SD-DR201-0000	27-Aug-98	90		Yes	No	LDW20-SS127	LDW20-SS127	11-Jun-20	63	J	Yes	No	21.8	No	-30%	green
1	3.3	LDW-SS106	LDW-SS106-010	08-Mar-05	15	J	Yes	No	LDW20-SS139	LDW20-SS139	11-Jun-20	17.2	J	Yes	No	15.3	No	15%	green
2	3.7	R19	SD0019	11-Oct-97	160		Yes	No	LDW20-SS214	LDW20-SS214	15-Jun-20	90.7	J	Yes	No	22.7	No	-43%	green
2	3.8	DR210	SD-DR210-0000	25-Aug-98	190		Yes	No	LDW20-SS224	LDW20-SS224	19-Jun-20	68.8	J	Yes	No	21.8	No	-64%	green
3	3.9	AN-019	AN019-SS-061024	24-Oct-06	67		Yes	No	LDW20-SS257	LDW20-SS257	26-Jun-20	46.8	J	Yes	No	13.7	No	-30%	green
3	4.0	IT-13	IT-13-SED COMP	28-Jul-11	74		Yes	No	LDW20-SS304	LDW20-SS304	25-Jun-20	50.8	J	Yes	No	8.9	No	-31%	green
4	4.1	RP-05	RP-05	12-Oct-11	260		Yes	No	LDW20-SS306	LDW20-SS306	23-Jun-20	194		Yes	No	8.7	No	-25%	green
4	4.1	RP-07	RP-07	12-Oct-11	310		Yes	No	LDW20-SS309	LDW20-SS309	24-Jun-20	318		Yes	No	8.7	No	3%	green
4	4.1	SB-12	Upper SB-12	25-Aug-04	1200	J	Yes	Yes	LDW20-SS310	LDW20-SS310	18-Jun-20	117	J	Yes	No	15.8	Yes	-90%	blue
4	4.1	RP-23	RP-23	13-Feb-12	48	J	Yes	No	LDW20-SS318	LDW20-SS318	18-Jun-20	150	J	Yes	No	8.4	No	213%	green
4	4.1	SH-06	Upper SH-06	25-Aug-04	390	J	Yes	No	LDW20-SS320	LDW20-SS320	25-Jun-20	17.4	J	Yes	No	15.8	No	-96%	green
6	4.2	LDW-SS131	LDW-SS131-010	08-Mar-05	110		Yes	No	LDW20-SS332	LDW20-SS332	17-Jun-20	40.6	J	Yes	No	15.3	No	-63%	green
5	4.2	DR176	SD-DR176-0000	31-Aug-98	760		Yes	No	LDW20-SS338	LDW20-SS338	10-Jun-20	105	J	Yes	No	21.8	No	-86%	green
5	4.2	SB-8	Upper SB-08	26-Aug-04	630	J	Yes	No	LDW20-SS340	LDW20-SS340	16-Jun-20	60.2	J	Yes	No	15.8	No	-90%	green
5	4.2	DR243	SD-DR243-0000	24-Aug-98	410		Yes	No	LDW20-SS345	LDW20-SS345	16-Jun-20	220		Yes	No	21.8	No	-46%	green
5	4.2	DR244	SD-DR244-0000	01-Sep-98	300		Yes	No	LDW20-SS346	LDW20-SS346	16-Jun-20	148	J	Yes	No	21.8	No	-51%	green
5	4.2	SB-5	Upper SB-05	24-Aug-04	940	J	Yes	No	LDW20-SS347	LDW20-SS347	15-Jun-20	114	J	Yes	No	15.8	No	-88%	green
5	4.2	SB-4	Upper SB-04	24-Aug-04	920	J	Yes	No	LDW20-SS348	LDW20-SS348	16-Jun-20	109	J	Yes	No	15.8	No	-88%	green
5	4.2	R44	SD0071	16-Oct-97	1200	J	Yes	Yes	LDW20-SS349	LDW20-SS349	16-Jun-20	224		Yes	No	22.7	Yes	-81%	blue
5	4.2	SB-1	Upper SB-01	25-Aug-04	2300	J	Yes	Yes	LDW20-SS351	LDW20-SS351	16-Jun-20	165		Yes	No	15.8	Yes	-93%	blue
5	4.2	SB-3	Upper SB-03	24-Aug-04	1900	J	Yes	Yes	LDW20-SS352	LDW20-SS352	15-Jun-20	164		Yes	No	15.8	Yes	-91%	blue
5	4.2	LDW-SS2080-A	LDW-SS2080-A	21-Mar-11	430		Yes	No	LDW20-SS353	LDW20-SS353	16-Jun-20	228		Yes	No	9.2	No	-47%	green
6	4.4	R63	SD0035	13-Oct-97	1400		Yes	Yes	LDW20-SS364	LDW20-SS364	10-Jun-20	638		Yes	No	22.7	Yes	-54%	blue
6	4.5	B9a	LDW-B9a-S	27-Aug-04	120		Yes	No	LDW20-SS372	LDW20-SS372	17-Jun-20	33.6	J	Yes	No	15.8	No	-72%	green
6	4.5	LDW-SSB9a	LDW-SSB9a-010	15-Mar-05	42		Yes	No	LDW20-SS372	LDW20-SS372	17-Jun-20	33.6	J	Yes	No	15.3	No	-20%	green
6	4.6	R75	SD0049	15-Oct-97	61	J	Yes	No	LDW20-SS377	LDW20-SS377	18-Jun-20	70.9	J	Yes	No	22.7	No	16%	green
6	4.7	BKG-2	BKG-2-SED COMP	30-Jul-11	2400	J	Yes	Yes	LDW20-SS383	LDW20-SS383	25-Jun-20	1680		Yes	Yes	8.9	Yes	-30%	gray
6	4.8	B10a	LDW-B10a-S	30-Aug-04	110		Yes	No	LDW20-SS389	LDW20-SS389	25-Jun-20	42.2		Yes	No	15.8	No	-62%	green
7	4.9	LDW-SS2097-D	LDW-SS2097-D	18-Mar-11	92	J	Yes	No	LDW20-SS401	LDW20-SS401	23-Jun-20	56.8	J	Yes	No	9.3	No	-38%	green
7	4.9	NFK304	L7462-4	06-Dec-95	110	U	No	No	LDW20-SS401	LDW20-SS401	23-Jun-20	56.8	J	Yes	No	24.6	No	-48%	green
7	4.9	NFK307	L7462-7	06-Dec-95	100		Yes	No	LDW20-SS404	LDW20-SS404	24-Jun-20	17.9	U	No	No	24.6	No	-82%	green
7	4.9	NFK308	L7462-8	06-Dec-95	110		Yes	No	LDW20-SS406	LDW20-SS406	23-Jun-20	31	J	Yes	No	24.6	No	-72%	green
7	4.9	NFK311	L7462-11	05-Dec-95	227		Yes	No	LDW20-SS407	LDW20-SS407	24-Jun-20	17.3	J	Yes	No	24.6	No	-92%	green
7	4.9	LDW-SS144	LDW-SS144-010	15-Mar-05	170	J	Yes	No	LDW20-SS411	LDW20-SS411	22-Jun-20	47.3	J	Yes	No	15.3	No	-72%	green
7	4.9	NFK004A	L4384-1	22-Aug-94	428	J	Yes	No	LDW20-SS423	LDW20-SS423	30-Jun-20	536		Yes	No	25.9	No	25%	green
7	5.0	NFK006	L4321-6	18-Aug-94	1060	J	Yes	Yes	LDW20-SS426	LDW20-SS426	17-Jun-20	45.7	J	Yes	No	25.9	Yes	-96%	blue

Table I-6
Comparison of BEHP Results at Re-sampled Locations

		RI/FS and Post-FS Data									PDI Phase 1 Data									Location Trend			
Recovery Category Evaluation Area	RM	Location Name	Sample Name	Sample Date	BEHP (µg/kg dw)	Qualifier	Detected?	Exceeds SCO?	Exceeds CSL?	Detected Above SCO?	Location_Name	Sample_Name	Sample_Date	BEHP (µg/kg dw)	Qualifier	Detected	Exceeds SCO2015	Exceeds CSL2015	Detected Above SCO?	Time Between Samples (Years)	Either_Above_SCO	Pcnt_change	Trend_code
1	3.1	LDW-SSB7a	LDW-SSB7a-010	18-Mar-05	150		Yes	No	No	No	LDW20-SS106	LDW20-SS106	10-Jun-20	69.8		Yes	No	No	No	15.2	No	-53%	green
1	3.1	B7a	LDW-B7a-S	30-Aug-04	63	J	Yes	No	No	No	LDW20-SS106	LDW20-SS106	10-Jun-20	69.8		Yes	No	No	No	15.8	No	11%	green
1	3.2	DR201	SD-DR201-0000	27-Aug-98	150		Yes	No	No	No	LDW20-SS127	LDW20-SS127	11-Jun-20	61.1		Yes	No	No	No	21.8	No	-59%	green
1	3.3	LDW-SS106	LDW-SS106-010	08-Mar-05	20	U	No	No	No	No	LDW20-SS139	LDW20-SS139	11-Jun-20	42.6	J	Yes	No	No	No	15.3	No	113%	green
2	3.7	R19	SD0019	11-Oct-97	240		Yes	No	No	No	LDW20-SS214	LDW20-SS214	15-Jun-20	122		Yes	No	No	No	22.7	No	-49%	green
2	3.8	DR210	SD-DR210-0000	25-Aug-98	200		Yes	No	No	No	LDW20-SS224	LDW20-SS224	19-Jun-20	61.5		Yes	No	No	No	21.8	No	-69%	green
3	3.9	AN-019	AN019-SS-061024	24-Oct-06	86	U	No	No	No	No	LDW20-SS257	LDW20-SS257	26-Jun-20	84.3		Yes	No	No	No	13.7	No	-2%	green
3	4.0	IT-13	IT-13-SED COMP	28-Jul-11	24	U	No	No	No	No	LDW20-SS304	LDW20-SS304	25-Jun-20	49.7	U	No	No	No	No	8.9	No	107%	green
4	4.1	RP-05	RP-05	12-Oct-11	100		Yes	No	No	No	LDW20-SS306	LDW20-SS306	23-Jun-20	36.9	J	Yes	No	No	No	8.7	No	-63%	green
4	4.1	RP-07	RP-07	12-Oct-11	63	U	No	No	No	No	LDW20-SS309	LDW20-SS309	24-Jun-20	53.1		Yes	No	No	No	8.7	No	-16%	green
4	4.1	SB-12	Upper SB-12	25-Aug-04	1100	U	No	Yes	No	No	LDW20-SS310	LDW20-SS310	18-Jun-20	79.3		Yes	No	No	No	15.8	No	-93%	green
4	4.1	RP-23	RP-23	13-Feb-12	38		Yes	No	No	No	LDW20-SS318	LDW20-SS318	18-Jun-20	80.7		Yes	No	No	No	8.4	No	112%	green
4	4.1	SH-06	Upper SH-06	25-Aug-04	850	U	No	Yes	Yes	No	LDW20-SS320	LDW20-SS320	25-Jun-20	49.8	U	No	No	No	No	15.8	No	-94%	green
6	4.2	LDW-SS131	LDW-SS131-010	08-Mar-05	130	U	No	No	No	No	LDW20-SS332	LDW20-SS332	17-Jun-20	121		Yes	No	No	No	15.3	No	-7%	green
5	4.2	DR176	SD-DR176-0000	31-Aug-98	450		Yes	No	No	No	LDW20-SS338	LDW20-SS338	10-Jun-20	230		Yes	No	No	No	21.8	No	-49%	green
5	4.2	SB-8	Upper SB-08	26-Aug-04	1500	U	No	Yes	No	No	LDW20-SS340	LDW20-SS340	16-Jun-20	88.2		Yes	No	No	No	15.8	No	-94%	green
5	4.2	DR243	SD-DR243-0000	24-Aug-98	380		Yes	No	No	No	LDW20-SS345	LDW20-SS345	16-Jun-20	185		Yes	No	No	No	21.8	No	-51%	green
5	4.2	DR244	SD-DR244-0000	01-Sep-98	360		Yes	No	No	No	LDW20-SS346	LDW20-SS346	16-Jun-20	158		Yes	No	No	No	21.8	No	-56%	green
5	4.2	SB-5	Upper SB-05	24-Aug-04	1500	U	No	Yes	No	No	LDW20-SS347	LDW20-SS347	15-Jun-20	295		Yes	No	No	No	15.8	No	-80%	green
5	4.2	SB-4	Upper SB-04	24-Aug-04	1900		Yes	Yes	No	Yes	LDW20-SS348	LDW20-SS348	16-Jun-20	147		Yes	No	No	No	15.8	Yes	-92%	blue
5	4.2	R44	SD0071	16-Oct-97	670		Yes	No	No	No	LDW20-SS349	LDW20-SS349	16-Jun-20	194		Yes	No	No	No	22.7	No	-71%	green
5	4.2	SB-1	Upper SB-01	25-Aug-04	1600		Yes	Yes	No	Yes	LDW20-SS351	LDW20-SS351	16-Jun-20	164		Yes	No	No	No	15.8	Yes	-90%	blue
5	4.2	SB-3	Upper SB-03	24-Aug-04	2100		Yes	Yes	No	Yes	LDW20-SS352	LDW20-SS352	15-Jun-20	374		Yes	No	No	No	15.8	Yes	-82%	blue
5	4.2	LDW-SS2080-A	LDW-SS2080-A	21-Mar-11	220		Yes	No	No	No	LDW20-SS353	LDW20-SS353	16-Jun-20	253		Yes	No	No	No	9.2	No	15%	green
6	4.4	R63	SD0035	13-Oct-97	340		Yes	No	No	No	LDW20-SS364	LDW20-SS364	10-Jun-20	151		Yes	No	No	No	22.7	No	-56%	green
6	4.5	B9a	LDW-B9a-S	27-Aug-04	210	J	Yes	No	No	No	LDW20-SS372	LDW20-SS372	17-Jun-20	54		Yes	No	No	No	15.8	No	-74%	green
6	4.5	LDW-SSB9a	LDW-SSB9a-010	15-Mar-05	84		Yes	No	No	No	LDW20-SS372	LDW20-SS372	17-Jun-20	54		Yes	No	No	No	15.3	No	-36%	green
6	4.6	R75	SD0049	15-Oct-97	430		Yes	No	No	No	LDW20-SS377	LDW20-SS377	18-Jun-20	224		Yes	No	No	No	22.7	No	-48%	green
6	4.7	BKG-2	BKG-2-SED COMP	30-Jul-11	59		Yes	No	No	No	LDW20-SS383	LDW20-SS383	25-Jun-20	49.8	U	No	No	No	No	8.9	No	-16%	green
6	4.8	B10a	LDW-B10a-S	30-Aug-04	39	U	No	No	No	No	LDW20-SS389	LDW20-SS389	25-Jun-20	49.9	U	No	No	No	No	15.8	No	28%	green
7	4.9	NFK304	L7462-4	06-Dec-95	260		Yes	No	No	No	LDW20-SS401	LDW20-SS401	23-Jun-20	99.2		Yes	No	No	No	24.6	No	-62%	green
7	4.9	LDW-SS2097-D	LDW-SS2097-D	18-Mar-11	120		Yes	No	No	No	LDW20-SS401	LDW20-SS401	23-Jun-20	99.2		Yes	No	No	No	9.3	No	-17%	green
7	4.9	NFK307	L7462-7	06-Dec-95	230		Yes	No	No	No	LDW20-SS404	LDW20-SS404	24-Jun-20	49.5	U	No	No	No	No	24.6	No	-78%	green
7	4.9	NFK308	L7462-8	06-Dec-95	120	U	No	No	No	No	LDW20-SS406	LDW20-SS406	23-Jun-20	57.7		Yes	No	No	No	24.6	No	-52%	green
7	4.9	NFK311	L7462-11	05-Dec-95	290		Yes	No	No	No	LDW20-SS407	LDW20-SS407	24-Jun-20	49.6	U	No	No	No	No	24.6	No	-83%	green
7	4.9	LDW-SS144	LDW-SS144-010	15-Mar-05	28		Yes	No	No	No	LDW20-SS411	LDW20-SS411	22-Jun-20	44.8	J	Yes	No	No	No	15.3	No	60%	green
7	4.9	NFK004A	L4384-1	22-Aug-94	2600		Yes	Yes	Yes	Yes	LDW20-SS423	LDW20-SS423	30-Jun-20	514		Yes	No	No	No	25.9	Yes	-80%	blue
7	5.0	NFK006	L4321-6	18-Aug-94	180		Yes	No	No	No	LDW20-SS426	LDW20-SS426	17-Jun-20	41.5	J	Yes	No	No	No	25.9	No	-77%	green

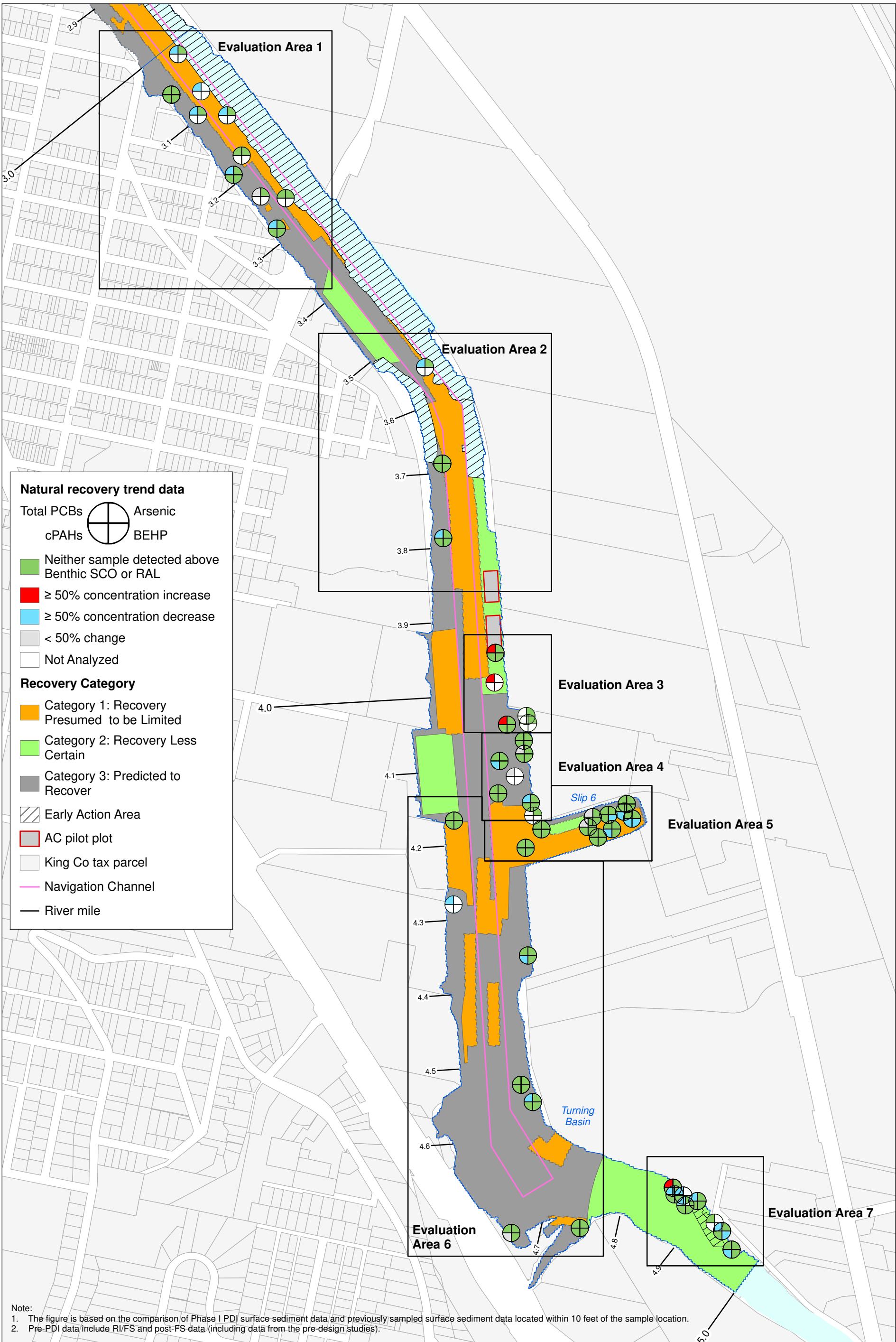
Appendix I Figure

Trends in Resampled Surface Sediment



Appendix I Maps

Prepared by craigh, 2/9/21; W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase I Data Evaluation Report\Map I-1 7246 Contaminant trends.mxd



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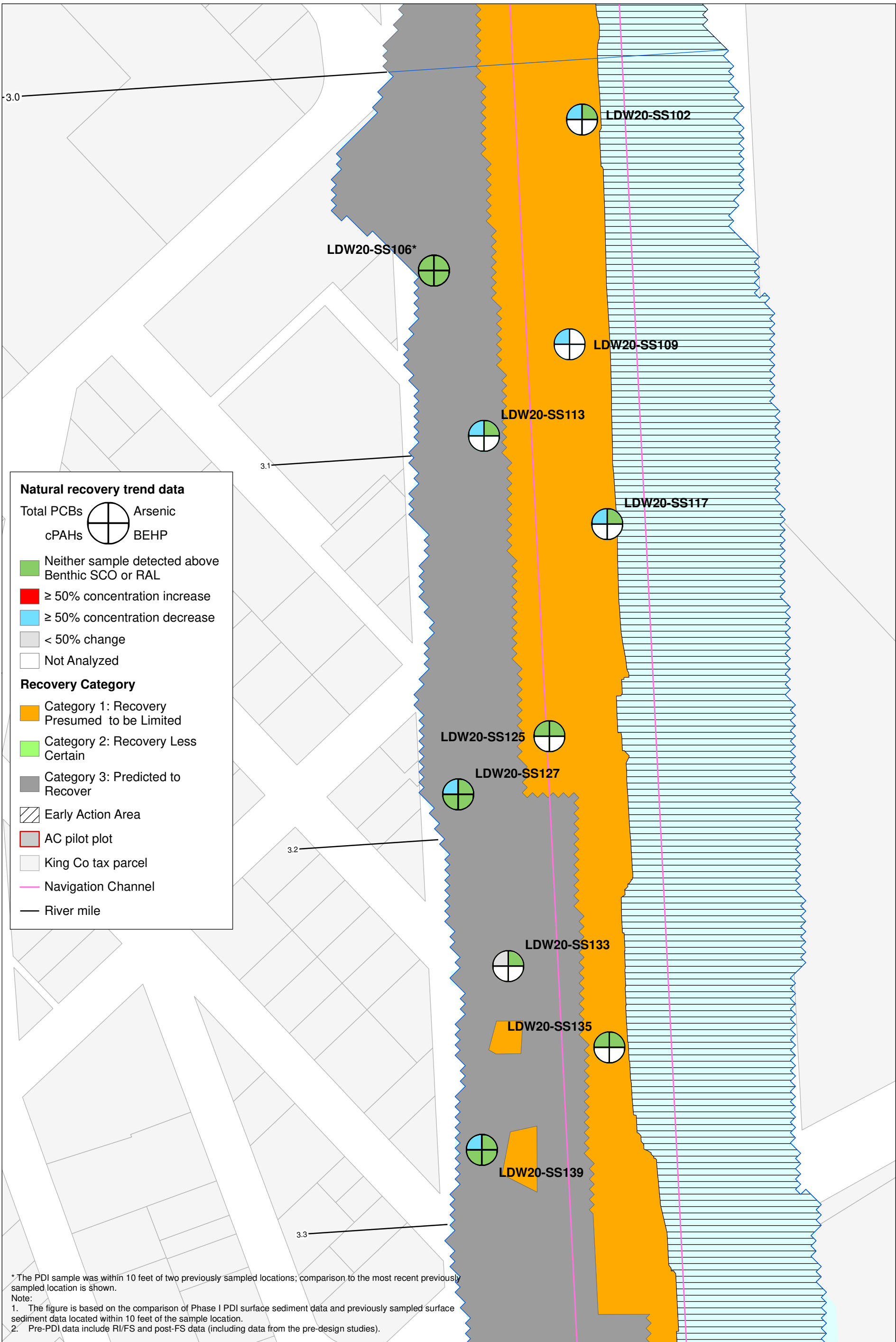
0 500 1,000 Feet
0 100 200 Meters

Map I-1. Comparison between Phase I PDI data and pre-PDI data at re-occupied locations

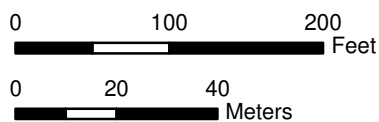
PRE-DESIGN INVESTIGATION PHASE I DATA
EVALUATION REPORT FOR THE LDW UPPER REACH

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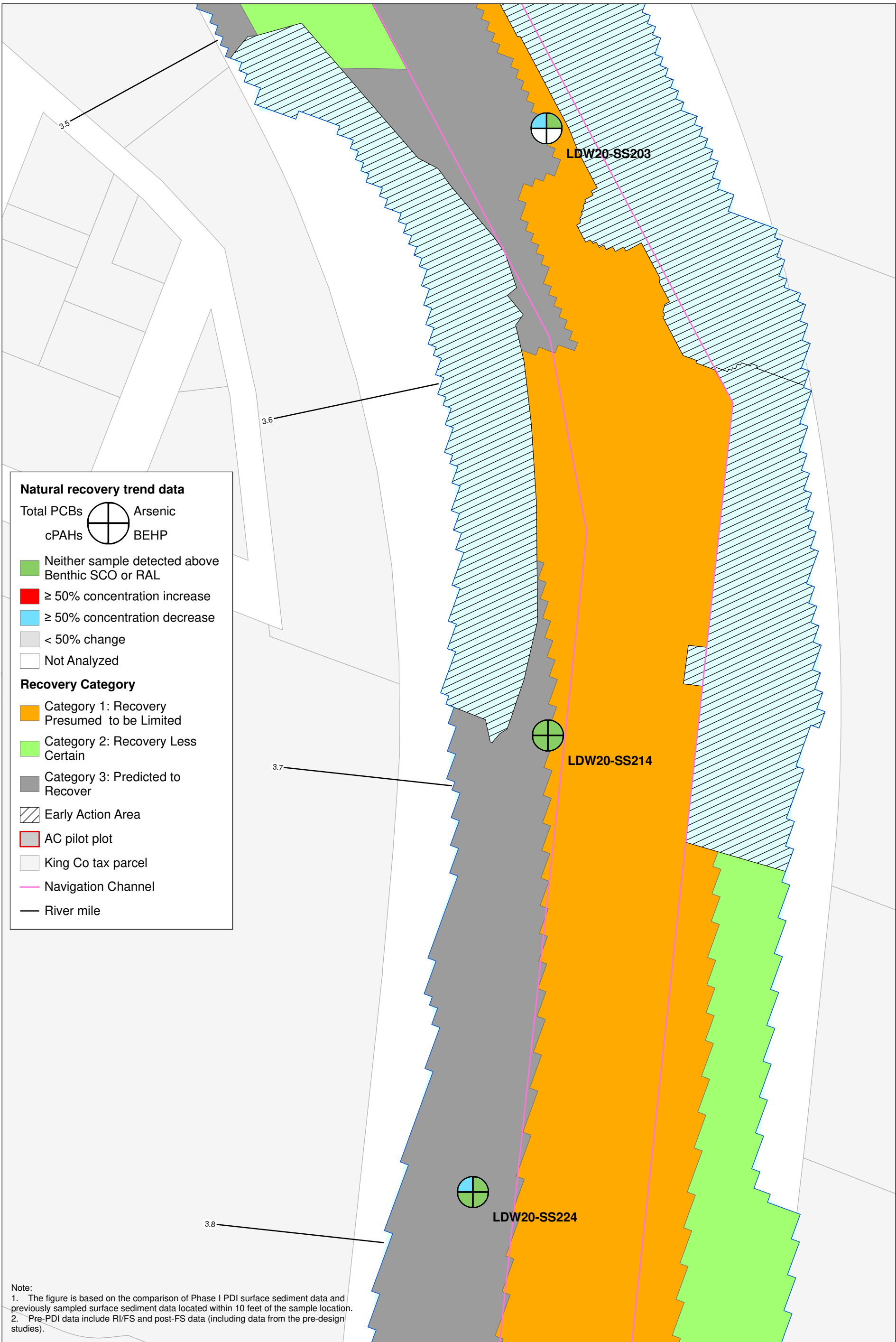


Map I-2. Comparison between Phase I PDI data and pre-PDI data at re-occupied locations - Evaluation Area 1

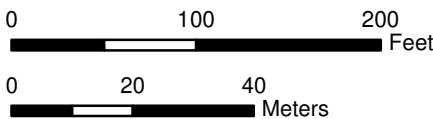
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EVALUATION REPORT FOR THE LDW UPPER REACH

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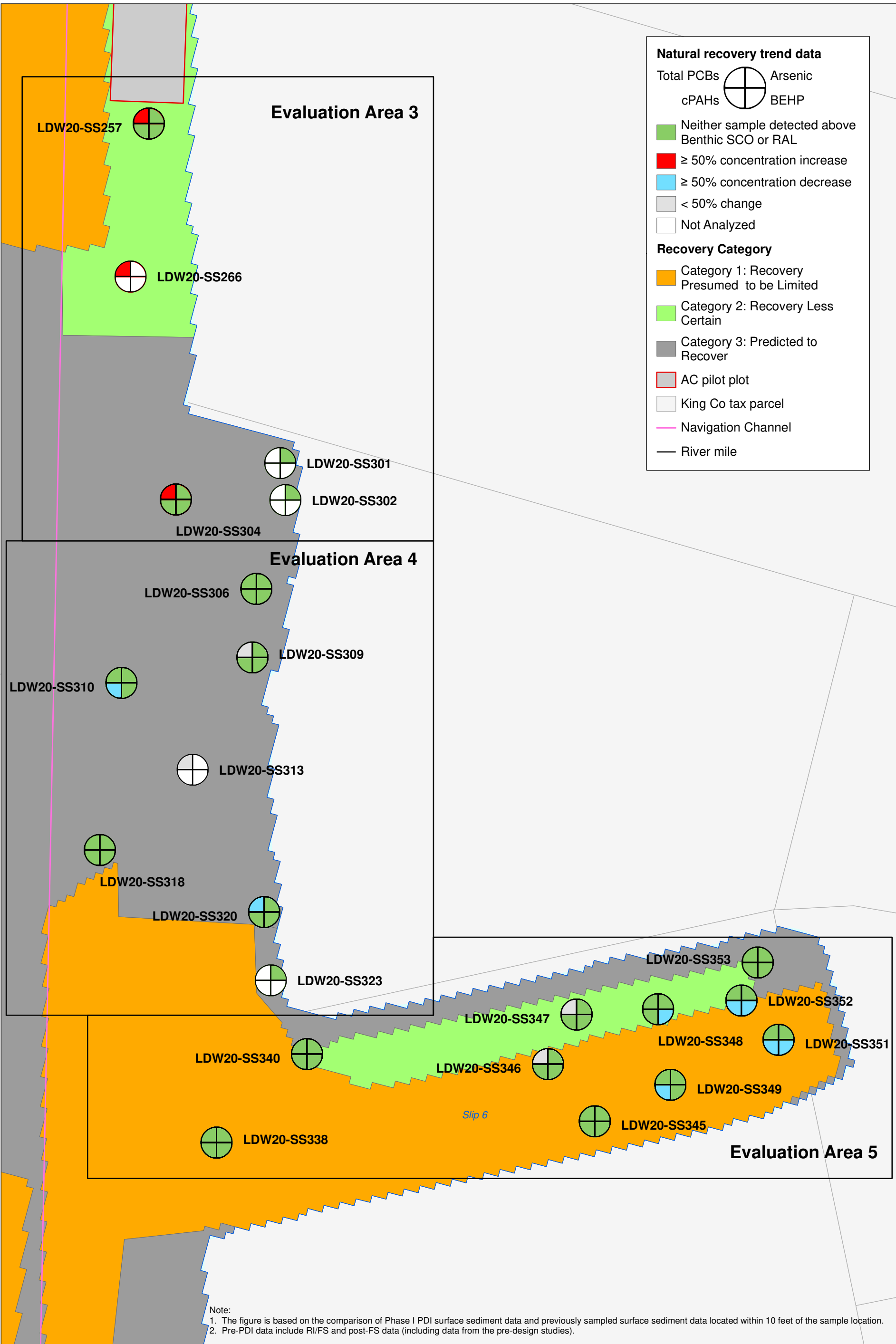


Map I-3. Comparison between Phase I PDI data and pre-PDI data at re-occupied locations - Evaluation Area 2

PRE-DESIGN INVESTIGATION PHASE I DATA
EVALUATION REPORT FOR THE LDW UPPER REACH

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0 100 200 Feet

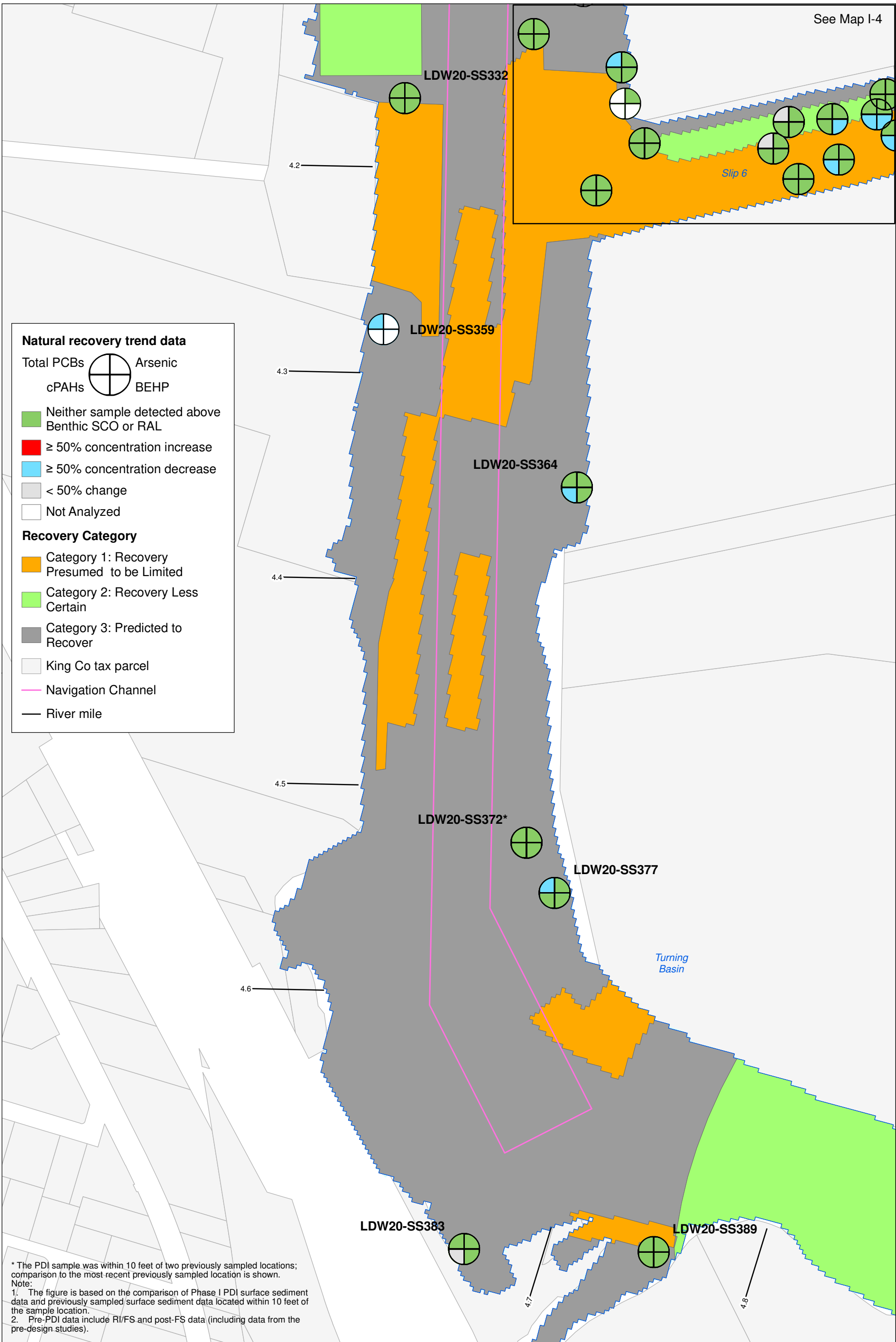
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Map I-4. Comparison between Phase I PDI data and pre-PDI data at re-occupied locations - Evaluation Areas 3, 4, and 5

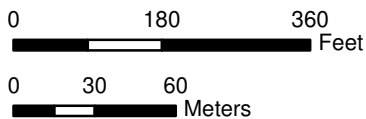
PRE-DESIGN INVESTIGATION PHASE I DATA
EVALUATION REPORT FOR THE LDW UPPER REACH

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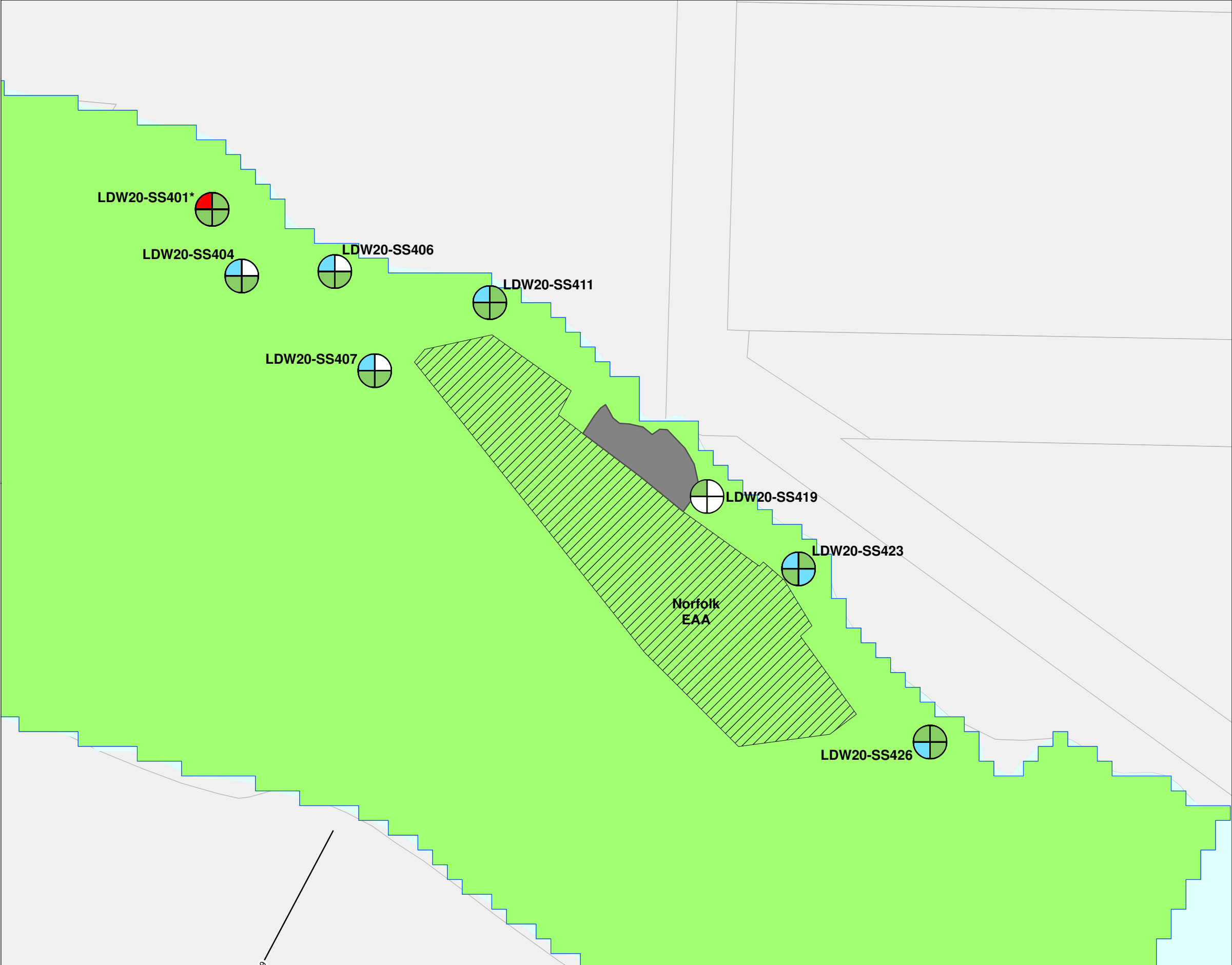


Map I-5. Comparison between Phase I PDI data and pre-PDI data at re-occupied locations - Evaluation Area 6

PRE-DESIGN INVESTIGATION PHASE I DATA
EVALUATION REPORT FOR THE LDW UPPER REACH

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Natural recovery trend data

Total PCBs
cPAHs

Arsenic
BEHP

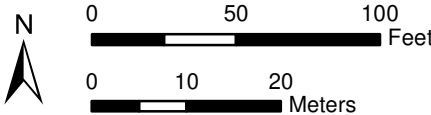
- Neither sample detected above Benthic SCO or RAL
- ≥ 50% concentration increase
- ≥ 50% concentration decrease
- < 50% change
- Not

Recovery Category

- Category 2: Recovery Less Certain
- Boeing South Storm Drain
- Early Action Area
- King Co tax parcel
- River mile

* The PDI sample was within 10 feet of two previously sampled locations; comparison to the most recent previously sampled location is shown.

- Note:
- The figure is based on the comparison of Phase I PDI surface sediment data and previously sampled surface sediment data located within 10 feet of the sample location.
 - Pre-PDI data include RI/FS and post-FS data (including data from the pre-design studies).

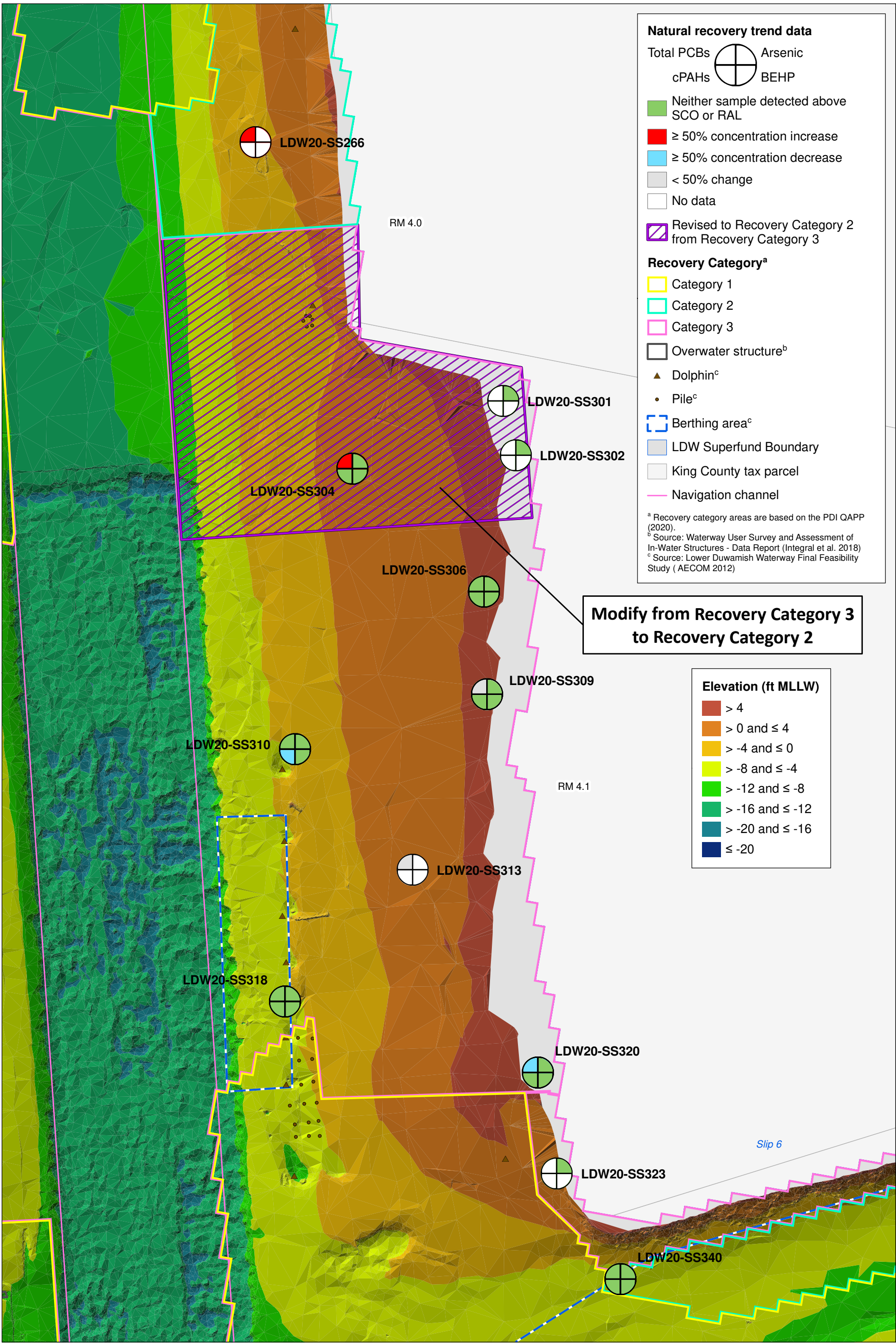


Map I-6. Comparison between Phase I PDI data and pre-PDI data at re-occupied locations - Evaluation Area 7

PRE-DESIGN INVESTIGATION PHASE I DATA
EVALUATION REPORT FOR THE LDW UPPER REACH **DRAFT**



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Natural recovery trend data

- Total PCBs Arsenic
cPAHs BEHP
- Neither sample detected above SCO or RAL
- ≥ 50% concentration increase
- ≥ 50% concentration decrease
- < 50% change
- No data

Revised to Recovery Category 2 from Recovery Category 3

Recovery Category^a

- Category 1
- Category 2
- Category 3
- Overwater structure^b
- Dolphin^c
- Pile^c
- Berthing area^c
- LDW Superfund Boundary
- King County tax parcel
- Navigation channel

^a Recovery category areas are based on the PDI QAPP (2020).
^b Source: Waterway User Survey and Assessment of In-Water Structures - Data Report (Integral et al. 2018)
^c Source: Lower Duwamish Waterway Final Feasibility Study (AECOM 2012)

Modify from Recovery Category 3 to Recovery Category 2

Elevation (ft MLLW)

- > 4
- > 0 and ≤ 4
- > -4 and ≤ 0
- > -8 and ≤ -4
- > -12 and ≤ -8
- > -16 and ≤ -12
- > -20 and ≤ -16
- ≤ -20